The Consultative Committee for Space Data Systems

Draft Recommendation for
Space Data System Practices

SPACECRAFT ONBOARD INTERFACE SERVICES—SUBNETWORK MEMORY ACCESS SERVICE

DRAFT RECOMMENDED PRACTICE

CCSDS 852.0-R-1

RED BOOK

June 2007

AUTHORITY

Issue:	Red Book, Issue 1
Date:	June 2007
Location:	Not Applicable

(WHEN THIS RECOMMENDED PRACTICE IS FINALIZED, IT WILL CONTAIN THE FOLLOWING STATEMENT OF AUTHORITY:)

This document has been approved for publication by the Management Council of the Consultative Committee for Space Data Systems (CCSDS) and represents the consensus technical agreement of the participating CCSDS Member Agencies. The procedure for review and authorization of CCSDS documents is detailed in the *Procedures Manual for the Consultative Committee for Space Data Systems*, and the record of Agency participation in the authorization of this document can be obtained from the CCSDS Secretariat at the address below.

This document is published and maintained by:

CCSDS Secretariat
Office of Space Communication (Code M-3)
National Aeronautics and Space Administration
Washington, DC 20546, USA

STATEMENT OF INTENT

(WHEN THIS RECOMMENDED PRACTICE IS FINALIZED, IT WILL CONTAIN THE FOLLOWING STATEMENT OF INTENT:)

The Consultative Committee for Space Data Systems (CCSDS) is an organization officially established by the management of its members. The Committee meets periodically to address data systems problems that are common to all participants, and to formulate sound technical solutions to these problems. Inasmuch as participation in the CCSDS is completely voluntary, the results of Committee actions are termed **Recommendations** and are not in themselves considered binding on any Agency.

CCSDS Recommendations take two forms: **Recommended Standards** that are prescriptive and are the formal vehicles by which CCSDS Agencies create the standards that specify how elements of their space mission support infrastructure shall operate and interoperate with others; and **Recommended Practices** that are more descriptive in nature and are intended to provide general guidance about how to approach a particular problem associated with space mission support. This **Recommended Practice** is issued by, and represents the consensus of, the CCSDS members. Endorsement of this **Recommended Practice** is entirely voluntary and does not imply a commitment by any Agency or organization to implement its recommendations in a prescriptive sense.

No later than five years from its date of issuance, this **Recommended Practice** will be reviewed by the CCSDS to determine whether it should: (1) remain in effect without change; (2) be changed to reflect the impact of new technologies, new requirements, or new directions; or (3) be retired or canceled.

In those instances when a new version of a **Recommended Practice** is issued, existing CCSDS-related member Practices and implementations are not negated or deemed to be non-CCSDS compatible. It is the responsibility of each member to determine when such Practices or implementations are to be modified. Each member is, however, strongly encouraged to direct planning for its new Practices and implementations towards the later version of the Recommended Practice.

FOREWORD

(WHEN THIS RECOMMENDED PRACTICE IS FINALIZED, IT WILL CONTAIN THE FOLLOWING FOREWORD:)

This document is a technical **Recommended Practice** for use in developing flight and ground systems for space missions and has been prepared by the **Consultative Committee for Space Data Systems** (CCSDS). The *Subnetwork Memory Access Service* described herein is intended for missions that are cross-supported between Agencies of the CCSDS, in the framework of the Spacecraft Onboard Interface Services (SOIS) CCSDS area.

This **Recommended Practice** specifies a service to be used by space missions to directly access memory locations distributed over an onboard subnetwork. The SOIS Subnetwork Memory Access Service is a simple service which may be used to read from or write to memory locations or memory blocks held in data systems or in unsophisticated devices. The service interface is only present in the data system invoking the service. The SOIS Subnetwork Memory Access Service provides a common service interface regardless of the particular type of data link being used for communication.

Through the process of normal evolution, it is expected that expansion, deletion, or modification of this document may occur. This Recommended Practice is therefore subject to CCSDS document management and change control procedures, which are defined in the *Procedures Manual for the Consultative Committee for Space Data Systems*. Current versions of CCSDS documents are maintained at the CCSDS Web site:

http://www.ccsds.org/

Questions relating to the contents or status of this document should be addressed to the CCSDS Secretariat at the address indicated on page i.

At time of publication, the active Member and Observer Agencies of the CCSDS were:

Member Agencies

- Agenzia Spaziale Italiana (ASI)/Italy.
- British National Space Centre (BNSC)/United Kingdom.
- Canadian Space Agency (CSA)/Canada.
- Centre National d'Etudes Spatiales (CNES)/France.
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)/Germany.
- European Space Agency (ESA)/Europe.
- Federal Space Agency (FSA)/Russian Federation.
- Instituto Nacional de Pesquisas Espaciais (INPE)/Brazil.
- Japan Aerospace Exploration Agency (JAXA)/Japan.
- National Aeronautics and Space Administration (NASA)/USA.

Observer Agencies

- Austrian Space Agency (ASA)/Austria.
- Belgian Federal Science Policy Office (BFSPO)/Belgium.
- Central Research Institute of Machine Building (TsNIIMash)/Russian Federation.
- Centro Tecnico Aeroespacial (CTA)/Brazil.
- Chinese Academy of Sciences (CAS)/China.
- Chinese Academy of Space Technology (CAST)/China.
- Commonwealth Scientific and Industrial Research Organization (CSIRO)/Australia.
- Danish National Space Center (DNSC)/Denmark.
- European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)/Europe.
- European Telecommunications Satellite Organization (EUTELSAT)/Europe.
- Hellenic National Space Committee (HNSC)/Greece.
- Indian Space Research Organization (ISRO)/India.
- Institute of Space Research (IKI)/Russian Federation.
- KFKI Research Institute for Particle & Nuclear Physics (KFKI)/Hungary.
- Korea Aerospace Research Institute (KARI)/Korea.
- MIKOMTEK: CSIR (CSIR)/Republic of South Africa.
- Ministry of Communications (MOC)/Israel.
- National Institute of Information and Communications Technology (NICT)/Japan.
- National Oceanic and Atmospheric Administration (NOAA)/USA.
- National Space Organization (NSPO)/Taiwan.
- Naval Center for Space Technology (NCST)/USA.
- Space and Upper Atmosphere Research Commission (SUPARCO)/Pakistan.
- Swedish Space Corporation (SSC)/Sweden.
- United States Geological Survey (USGS)/USA.

PREFACE

This document is a draft CCSDS Recommended Practice. Its draft status indicates that the CCSDS believes the document to be technically mature and has released it for formal review by appropriate technical organizations. As such, its technical contents are not stable, and several iterations of it may occur in response to comments received during the review process.

Implementers are cautioned **not** to fabricate any final equipment in accordance with this document's technical content.

DOCUMENT CONTROL

Document	Title	Date	Status
CCSDS 852.0-R-1	Spacecraft Onboard Interface Services—Subnetwork Memory Access Service, Draft Recommended Practice, Issue 1	June 2007	Current draft

CONTENTS

1 INTRODUCTION

1.1 PURPOSE AND SCOPE OF THIS DOCUMENT

This document comprises an output of the Spacecraft Onboard Interface Services (SOIS) Area of the Consultative Committee for Space Data Systems. It is one of a family of documents specifying the SOIS-compliant services to be provided by onboard subnetworks.

The purpose of this document is to define services and service interfaces provided by the SOIS Subnetwork Memory Access Service. Its scope is to specify the service only and not to specify methods of providing the service over a variety of onboard data links.

1.2 APPLICABILITY

This document applies to any mission or equipment claiming to provide a CCSDS SOIS-compliant Subnetwork Memory Access Service.

1.3 RATIONALE

SOIS provide service interface specifications in order to promote interoperability and development reuse via peer-to-peer and vertical standardisation.

1.4 DOCUMENT STRUCTURE

The document has five major sections:

- this section, containing administrative information, definitions and references;
- section 2, describing general concepts and assumptions;
- section 3, containing the Subnetwork Memory Access Service specification;
- section 4, containing the Management Information Base (MIB) for the service;
- section 5, comprising a Service Conformance Statement Proforma.

In addition, annex A contains informative references.

1.5 CONVENTIONS AND DEFINITIONS

1.5.1 BIT NUMBERING CONVENTION AND NOMENCLATURE

In accordance with modern data communications practice, spacecraft data fields are often grouped into eight-bit ‘words’ widely known as bytes. Throughout this Recommended Practice, such an eight-bit word is called an ‘octet’. The numbering for octets within a data structure starts with zero.

By CCSDS convention, any ‘spare’ bits shall be permanently set to ‘0’.

1.5.2 DEFINITIONS

1.5.2.1 General

Within the context of this document the following definitions apply.

1.5.2.2 Definitions from the Open Systems Interconnection (OSI) Basic Reference Model

This document is defined using the style established by the Open Systems Interconnection (OSI) Basic Reference Model (reference [1]). This model provides a common framework for the development of standards in the field of systems interconnection.

The following terms, used in this Recommended Practice, are adapted from definitions given in reference [2]:

Layer: A subdivision of the architecture, constituted by subsystems of the same rank.

Protocol Data Unit (PDU): A unit of data specified in a protocol and consisting of protocol-control information and possibly user data.

Service: A capability of a layer (service provider) together with the layers beneath it, which is provided to the service users.

Service Data Unit (SDU): An amount of information whose identity is preserved when transferred between peer entities in a given layer and which is not interpreted by the supporting entities in that layer.

1.5.2.3 Terms Defined in this Recommended Practice

For the purposes of this Recommended Practice, the following definitions also apply. Many other terms that pertain to specific items are defined in the appropriate sections.

Channel: An identifier for network resources associated with a resource reservation. May be a list of time slots in a time division multiplexed system or a bandwidth limit in a bandwidth division multiplexed system. The subnetwork resources required for the communication may also be defined to allow simultaneous use of non-conflicting resources on subnetworks that support this feature.

Maximum Transmission Unit (MTU): The maximum size of data that the a user can give as an SDU to the Subnetwork Packet Service. Note that the MTU is required to ensure that different sources of data get fair access to the transmission medium, by multiplexing traffic on a packet-by-packet basis. When a large data unit is being sent, segments from other data

units can get access to the subnetwork medium after each segment of the large data unit has been sent.

Octet: An eight-bit word commonly referred to as a byte.

Priority: The transmit precedence of an SDU relative to other SDUs.

Quality of Service (QoS): The ability of a communication system to provide predictable and differentiated services. Quality of Service for a communication service may be characterised in terms of important features relevant to that communications service, for example: Reliability, Transmission rate, Effective Bandwidth and latency, Error rate.

Service Access Point (SAP): Within the subnetwork, a SOIS Subnetwork Service Access Point. As a minimum it locates a data system and a subnetwork user entity within that data system.

1.6 HOW THIS DOCUMENT FITS INTO THE SOIS DOCUMENTATION TREE

This document conforms to the principles set out in the Spacecraft Onboard Interface Services Green Book (reference [A1]) and should not be applied without first consulting this reference. The protocols which provide this service are to be documented for individual links, and this may be in the purview of individual missions, agencies or of CCSDS depending on future circumstance.

1.7 DOCUMENT NOMENCLATURE

The following conventions apply throughout this Recommended Practice:

a) The words ‘shall’ and ‘must’ imply a binding and verifiable specification;

b) The word ‘should’ implies an optional, but desirable, specification;

c) The word ‘may’ implies an optional specification;

d) The words ‘is’, ‘are’, and ‘will’ imply statements of fact.

1.8 REFERENCES

The following documents contain provisions which, through reference in this text, constitute provisions of this Recommended Practice. At the time of publication, the editions indicated were valid. All documents are subject to revision, and users of this Recommended Practice are encouraged to investigate the possibility of applying the most recent editions of the documents indicated below. The CCSDS Secretariat maintains a register of currently valid CCSDS Documents.

[1] *Information Technology—Open Systems Interconnection—Basic Reference Model: The Basic Model*. International Standard, ISO/IEC 7498-1:1994. 2nd ed. Geneva: ISO, 1994.

[2] *Information Technology—Open Systems Interconnection—Basic Reference Model—Conventions for the Definition of OSI Services*. International Standard, ISO/IEC 10731:1994. Geneva: ISO, 1994.

[3] *Space Link Identifiers*. Recommendation for Space Data System Standards, CCSDS 135.0-B-3. Blue Book. Issue 3. Washington, D.C.: CCSDS, October 2006.

NOTE – Informative references are contained in annex A.

2 OVERVIEW

2.1 FUNCTION

The SOIS Subnetwork Memory Access Service provides a means for a user entity to retrieve or change data located in memory hosted by a node on a data link/subnetwork.

2.2 CONTEXT

The SOIS Subnetwork Layer provides the Memory Access Service to user applications. The service may be provided over a variety of data links and the method of such provision is not in the scope of this document.

As shown in figure 2-1**,** the service is one of a number of services which may be provided by the SOIS Subnetwork.

The Subnetwork Memory Access Service makes use of the data link to transfer data and control information. A variety of data links may be suited to provision of the service and the strategy for such service provision is outlined in reference **Error! Reference source not found.**.

The Memory Access Service is provided only to the application entity invoking the service. The method of changing or retrieving the data in memory is data-link specific.

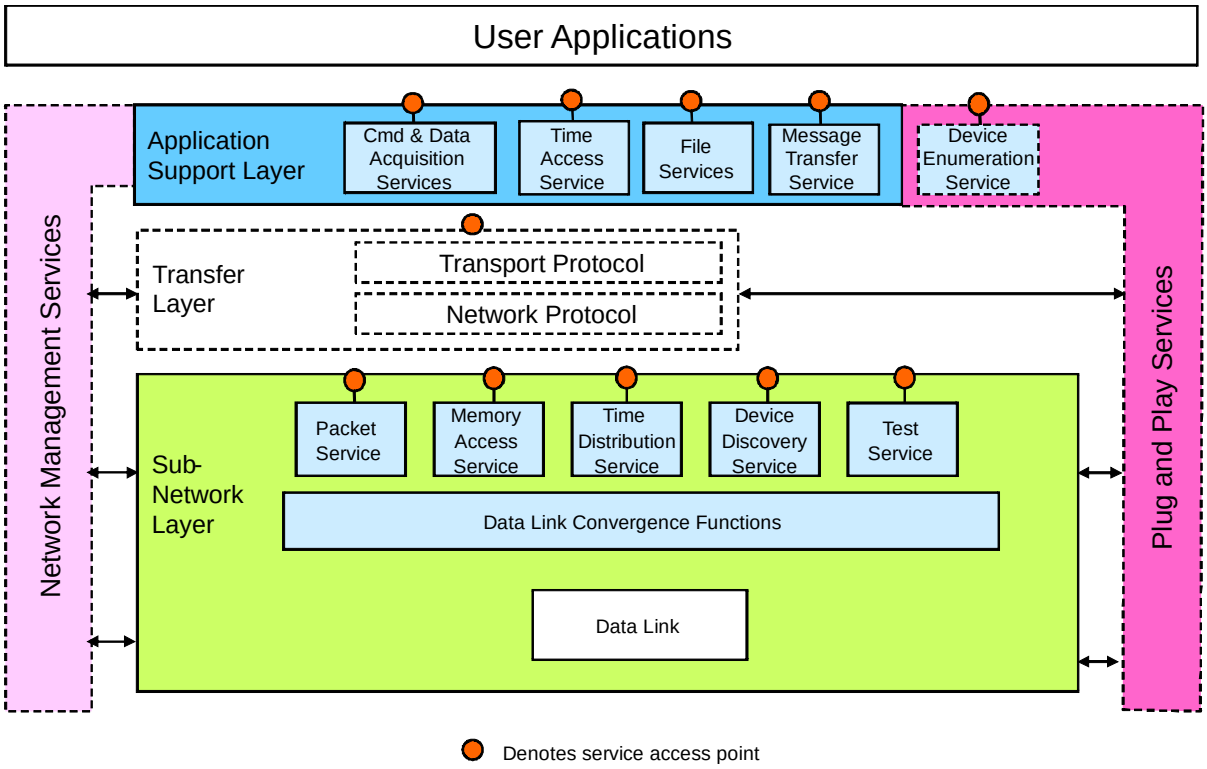

Figure 2-1: Subnetwork Memory Access Service Context

2.3 ASSUMPTIONS

The following assumptions have been made in designing the SOIS Subnetwork Memory Access Service:

– The SOIS Subnetwork Memory Access Service is provided across single subnetworks.

– The SOIS Subnetwork Memory Access Service is made available to protocol entities in the Transfer, Application Support, and User Application Layers.

2.4 QUALITY OF SERVICE

There are four communication service classes provided by the SOIS Subnetwork Memory Access Service:

– Best-Effort Service Class:

  • makes a single attempt to deliver data to its destination but cannot ensure that it will be delivered successfully;

  • provides data in sequence (within a priority value), without errors, and without duplication;

  • does not necessarily preserve the order of data packets;

  • uses a priority parameter to signal the importance of the data to the service.

  NOTE – Priority is applied across the best-effort and assured service classes where both classes are provided.

– Assured Service Class:

  • ensures delivery of data to its destination;

  • indicates to the sending entity if it is not possible to provide the assured service;

  • provides data in sequence (within a priority value), complete, without errors, and without duplication;

  • uses a priority parameter to signal the importance of the data to the service.

  NOTE – Priority is applied across the best-effort and assured service classes where both classes are provided.

– Reserved Service Class:

  • makes a single attempt to deliver data to its destination but cannot ensure that it will be delivered successfully;

  • provides data in sequence (within the channel and within a priority value), without errors, and without duplication;

- uses a channel that defines the resources that are used to transmit the SDU;
- uses a priority parameter to signal the importance of the data to the service.

NOTE – This priority defines the priority of a communication within the resource reservation, i.e., within a channel. Priority is applied across the reserved and guaranteed service classes where both classes are provided within a channel.

– Guaranteed Service Class:

- ensures delivery of data to its destination.
- indicates to the sending entity if it is not possible to provide the guaranteed service (i.e., the user is informed if it is not possible to deliver the data);
- provides data in sequence (within the channel and within a priority value), complete, without errors, and without duplication;
- uses a channel that defines the resources that are used to transmit the SDU;
- uses a priority parameter to signal the importance of the data to the service.

NOTE – This priority defines the priority of a communication within the resource reservation, i.e., within a Channel. Priority is applied across the reserved and guaranteed service classes where both classes are provided within a channel.

– Common features:

- SDUs extracted from PDUs containing errors will not be delivered;
- individual Service Data Units being sent cannot be larger than the MTU.

All service classes are sequence preserving within a channel and at a priority level. There is no service-wide sequence preservation unless all users operate with no channelisation and at a single priority. Sequence preservation will cause out-of-sequence data units in the best-effort and resource-reserved Qualities of Service to be deleted and not delivered to the user. It is therefore recommended that underlying data links be themselves inherently sequence preserving.

The best-effort and resource-reserved services deliver data in sequence and without errors; the implication of these qualities is that PDUs that are received out of sequence or with errors will not be delivered to the user.

3 SUBNETWORK MEMORY ACCESS SERVICE

3.1 SERVICE PARAMETERS

The parameters of the Subnetwork Memory Access Service are defined below:

Source Subnetwork Service Access Point (SSNSAP)

The SSNSAP identifies the SAP that identifies the user entity that wishes to invoke the Memory Access Service.

Destination Address

The Destination Address defines the data system where the memory is located. The Destination Address is a logic address which may be global to a spacecraft or local to the subnetwork. Reserved Destination Address values are controlled by reference [3].

Memory ID

The Memory ID identifies a logical memory space containing the requested address(es). It may distinguish between, e.g., volatile, non-volatile and read-only memory areas or between memories connected to different processing elements.

Start Memory Address

The start memory address defines the start address at which the invoking entity requires to access memory for the purpose of changing or retrieving data.

Size

This parameter enumerates the amount of data to be changed or retrieved.

Mask

The mask indicates which data are to be changed and which are not be changed in a read/modify/write operation.

Data

The value(s) which is (are) required to be written to memory in a write operation or the returned value(s) of the data in response to a read operation.

Service Class

The service class refers to one of the following qualities of service:

- Best effort;
- Assured;
- Reserved;
- Guaranteed.

Channel (Used for reserved or guaranteed service classes only)

A Channel fully specifies an end to end resource reservation for a network communication. For time division multiplexed (scheduled) systems, the Channel identifies a list of time slots that may be used to support transmission of the channel data. For systems based on bandwidth reservation, the Channel identifies the percentage of network resources that may be used to support the transmission. The time-slot allocation or bandwidth reservation for each channel is defined by management parameters of the protocol providing the Memory Access Service.

Priority

Priority indicates the importance of the data to the system. It allows operations to be prioritized. For resource reserved channels the specified priority allows operations within a channel to be prioritized.

Failure Metadata

Failure Metadata is information generated by the Subnetwork Memory Access Service provider to the sending entity to provide information related to a failure of service provision.

3.2 MEMORY ACCESS SERVICE PRIMITIVES

3.2.1 GENERAL

In this subsection the service primitives for the SOIS Subnetwork Memory Access Service are presented.

There are five primitives used by this service:

- READ.request which requests to retrieve the contents of memory;
- READ.indication which returns the retrieved contents of memory;
- WRITE.request which requests to change the contents of memory;
- READ/MODIFY/WRITE.request which invokes an atomic Read/Modify/Write cycle at the memory;
- MEMORY_ACCESS_FAILURE.indication which informs a user of the failure of a memory access operation.

3.2.2 READ. REQUEST

3.2.2.1 Function

The READ.request primitive requests the service to retrieve the contents of memory from specific locations(s) in a specific memory resident at a specific network location.

3.2.2.2 Semantics

READ.request (SSNSAP, Destination Address, Memory ID, Start Memory Address, Size)

3.2.2.3 When Generated

The **READ.request** primitive shall be passed to the SOIS Subnetwork Memory Access Service provider to request that a memory data be retrieved.

3.2.2.4 Effect on Receipt

Receipt of the **READ.request** primitive shall cause the SOIS Subnetwork service provider to retrieve the memory data.

3.2.2.5 Additional Comments

Destination Address identifies the data system where the memory is located.

SSNSAP identifies the invoking user entity.

Memory ID identifies the memory to be accessed at the destination node.

Start Memory Address identifies the start address, in the memory, of the requested data,

Size indicates the amount of requested data.

3.2.3 READ.INDICATION

3.2.3.1 Function

The **READ.indication** is used to pass the retrieved memory data to the user entity.

3.2.3.2 Semantics

READ.indication (SSNSAP, Destination Address, Memory ID, Start Memory Address, Size, Data)

3.2.3.3 When Generated

This primitive is issued by the service provider to the receiving application on receipt of a PDU (or set of PDUs) containing the memory data.

3.2.3.4 Effect on Receipt

The response of the user entity to a **READ.indication** primitive is unspecified.

3.2.3.5 Additional Comments

Destination Address identifies the data system where the memory, from which the data was retrieved, is located.

SSNSAP identifies the user entity receiving the memory data.

Memory ID identifies the memory which was accessed at the destination node.

Start Memory Address identifies the start address, in the memory, of the requested data.

Size indicates the amount of retrieved data.

Data is the data which was located at the requested memory addresses.

3.2.4 WRITE. REQUEST

3.2.4.1 Function

The WRITE.request primitive requests the service to change the contents of memory at specific location(s) in a specific memory resident at a specific network location.

3.2.4.2 Semantics

WRITE.request (SSNSAP, Destination Address, Memory ID, Start Memory Address, Size, Data)

3.2.4.3 When Generated

The **WRITE.request** primitive shall be passed to the SOIS Subnetwork Memory Access Service provider to request that data in memory be changed.

3.2.4.4 Effect on Receipt

Receipt of the **WRITE.request** primitive shall cause the SOIS Subnetwork service provider to change the data located in the specified memory location(s).

3.2.4.5 Additional Comments

Destination Address identifies the data system where the memory, where the data is to be changed, is located.

SSNSAP identifies the invoking user entity.

Memory ID identifies the memory which is to be accessed at the destination data system.

Start Memory Address identifies the start address, in the memory, of the data to be changed.

Size indicates the amount of data to be written.

Data is the data which is to be inserted into the requested memory addresses.

3.2.5 READ/MODIFY/WRITE. REQUEST

3.2.5.1 Function

The READ/MODIFY/WRITE.request primitive requests the service to retrieve the contents of memory from specific locations(s) in a specific memory resident at a specific network location and to modify that data whilst blocking attempts by other entities to modify it. It provides an atomic operation.

3.2.5.2 Semantics

READ/MODIFY/WRITE.request (SSNSAP, Destination Address, Memory ID, Memory Address, Size, Mask, Data)

3.2.5.3 When Generated

The **READ/MODIFY/WRITE.request** primitive shall be passed to the SOIS Subnetwork Memory Access Service provider to request that an atomic read/modify/write operation be performed at the memory address.

3.2.5.4 Effect on Receipt

Receipt of the **READ/MODIFY/WRITE.request** primitive shall cause the SOIS Subnetwork service provider at the Destination Address to retrieve the values of the memory data specified by the Memory ID, Memory Address, and Size, and to replace the data bits in this range identified by ones in the Mask with the corresponding bits in the Data field. The SOIS Subnetwork service shall ensure that the read, modify, and write operations are completed atomically.

The resulting memory in the destination system will correspond to this sequence of operations:

DM_after = (DM_before AND (NOT Mask)) OR (Data AND Mask)

The value DM_before is returned to the SSNSAP via a READ.indication.

3.2.5.5 Additional Comments

Destination Address identifies the data system where the memory is located.

SSNSAP identifies the invoking user entity.

Memory ID identifies the memory to be accessed at the destination node.

Start Memory Address identifies the start address, in the memory, of the requested data.

Size indicates the amount of data to be written.

Mask indicates which data is to be modified.

Data is the data which is to be inserted into the requested memory addresses.

3.2.6 MEMORY_ACCESS_FAILURE.INDICATION

3.2.6.1 Function

The **MEMORY_ACCESS_FAILURE.indication** primitive is used, for the guaranteed and assured service classes, to indicate to the user that requested a memory access operation, that it has been impossible to perform the operation.

3.2.6.2 Semantics

MEMORY_ACCESS_FAILURE.indication (SSNSAP, Destination Address, Memory ID, Start Memory Address, Size, Failure Metadata)

3.2.6.3 When Generated

This primitive is issued by the service provider to the service user when, for whatever reason, it has proved impossible to satisfy the service request.

3.2.6.4 Effect on Receipt

The effect of receipt of the **MEMORY_ACCESS_FAILURE.indication** primitive is unspecified.

3.2.6.5 Additional Comments

This primitive can be invoked only in relation to transactions related to the assured or guaranteed service classes.

DSNSAP identifies the user entity where the operation should have been performed.

SSNSAP identifies the user entity that requested the operation.

Failure Metadata contains information about the type of error that occurred resulting in the failure to perform the operation.

4 MANAGEMENT INFORMATION BASE

There is currently no Management Information Base associated with this service. All management items are associated with the protocol providing the service. Any protocol claiming to provide this service in a SOIS-compliant manner shall publish its Management Information Base as part of the protocol specification.

5 SERVICE CONFORMANCE STATEMENT PROFORMA

It is mandatory that, for any protocol implementation claiming to provide this service, this proforma be completed giving details of the capabilities of the implementation.

Service Conformance Statement **SOIS Subnetwork Memory access Service**

Implementation Information

Implementer Identification	
Implementation Identification	
Version	
Underlying Data Link	
Protocol Specification Reference	
MIB Reference	

Mandatory Features

READ.request	√
READ.indication	√
Best Effort Service Class	√

Optional Features

WRITE.request	
READ/MODIFY/WRITE.request	
MEMORY_ACCESS_ FAILURE.indication	
Assured Service Class	
Reserved Service Class	
Guaranteed Service Class	

Other Information

Priority Levels	
Channelisation	
Failure Metadata	

NOTE – For security and network integrity reasons, the mission designer may chose not to allow certain data systems to have access to the WRITE.request primitive.

ANNEX A

INFORMATIVE REFERENCES

[A1] *Spacecraft Onboard Interface Services*. Report Concerning Space Data System Standards, CCSDS 850.0-G-1. Green Book. Issue 1. Washington, D.C.: CCSDS, June 2007.

NOTE – Normative references are listed in 1.8.